Claims

The claimed invention is:

1. An adjuvant composition comprising one or more antimicrobial agents.

2. An adjuvant composition of claim 1 for use in a human vaccine.

3. An adjuvant compostion of claim 1 for use in an non-human animal vaccine.

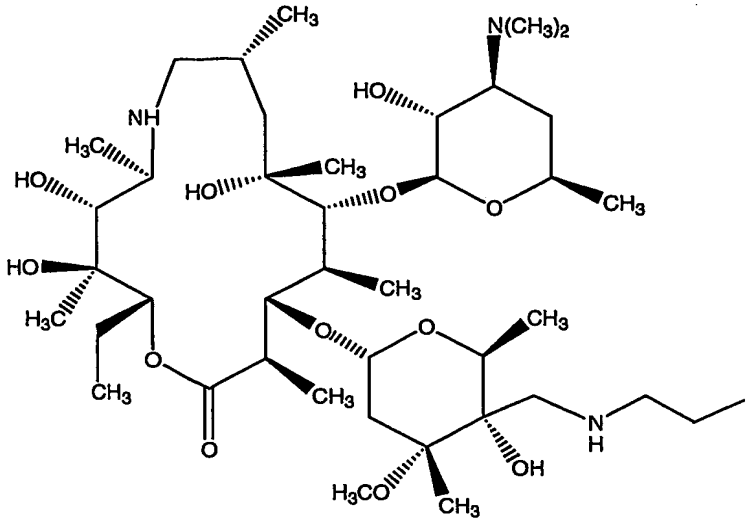
4. A human or non-human animal vaccine comprising at least two components, with the two components administered either concurrently, or co-adminstered within a month, where the first component is an adjuvant comprising one or more antimicrobial agents and the second component is one or more antigenic agents.

5. A vaccine of claim 4 where the antimicrobial agent is a macrolide or beta-lactam antibiotic.

6. A vaccine of claim 4 where the vaccine is for non-human animals, where the antimicrobial agent is a macrolide antibiotic such as tulathromycin sold under the trade name Draxxin® or a beta lactam antibiotic, such as a cephalosporin, such as ceftiofur, and where the antigenic agent is selected from one or more from the group consisting of a *M. haemolytica* antigen, a *M. haemolytica* leukotoxin, a *M. haemolytica* capsular antigen, a *M. haemolytica* soluble antigen, or a mixture thereof.

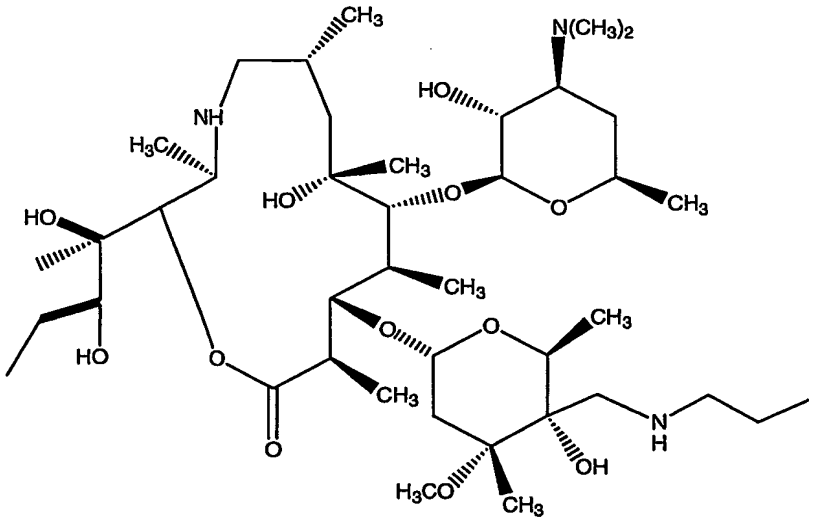
7. An adjuvant composition of claim 1 where said antimicrobial agent is comprised of at least one azalide selected from the group consisting of an 8a-azalide and a 9a-azalide, wherein said azalide acts as an adjuvant.

8. An adjuvant composition of claim 1, wherein said azalide is a 9a-azalide selected from the formula I:



I

9. An adjuvant composition of claim 4, further comprising a compound of formula II:



II

10. An adjuvant composition of claim 9, comprising (a) a mixture of compounds of formulae I and II in a ratio of about 90% ± 10% to about 10% ± 10%, respectively; (b) water; and (c) one or more acids present at a total concentration of from about 0.2 mmol to about 1.0 mmol per mL of the

11. A vaccine comprising any of the antimicrobial adjuvant compositions of claims 7-10 administered either concurrently or co-administered with an antigen.

12. A vaccine of claim 11 administered either concurrently or co-administered with an antigen selected from any *M. haemolytica* antigen with an adjuvant composition of claim 10, wherein said 9a-azalide is a composition comprising (a)(i) a mixture of compounds of formulae I and II in a ratio of about 90% ± 10% to about 10% ± 10%, respectively; (ii) water; and (iii) one or more acids present at a total concentration of from about 0.2 mmol to about 1.0 mmol per mL of the composition; and (b) one or more water-miscible co-solvents present in an amount of from about 250 to about 750 mg per mL of the composition.

13. A vaccine administered either concurrently or co-administered with any of the an antigen selected from any *M. haemolytica* antigen with an adjuvant composition comprising any ceftiofur.

14. A method for enhancing, increasing, upwardly modulating, diversifying or otherwise facilitating an immune response in an animal to an antigen comprising administration of an antimicrobial agent to an animal.

15. A method of claim 14 where the antimicrobial agent is at least one adjuvant component of a concurrent administration of an antimicrobial agents and an antigen, where the antimicrobial agent is selected from the antimicrobial agents described herein, and where the antigenic agents are described herein.

16. A method of claim 14 where the antimicrobial agent is at least one adjuvant component of a co-administration of an antimicrobial agents and an antigen, where the

antimicrobial agent is selected from the antimicrobial agents described herein, and where the antigenic agents are described herein.

17. A method of preventing a disease caused by a pathogenic agent, cancerous cell, or allergen in an animal comprising the step of administering the adjuvant compositions or vaccines described herein and in claims 1-14 to an animal susceptible to said disease.

18. A kit comprising the adjuvant or vaccines of claims 1-14, where the components of the kit has either an antimicrobial agent or an antigenic agent or both and where said components that can be either co-administered or concurrently administered, with instructions for use thereof.

FIG. 1

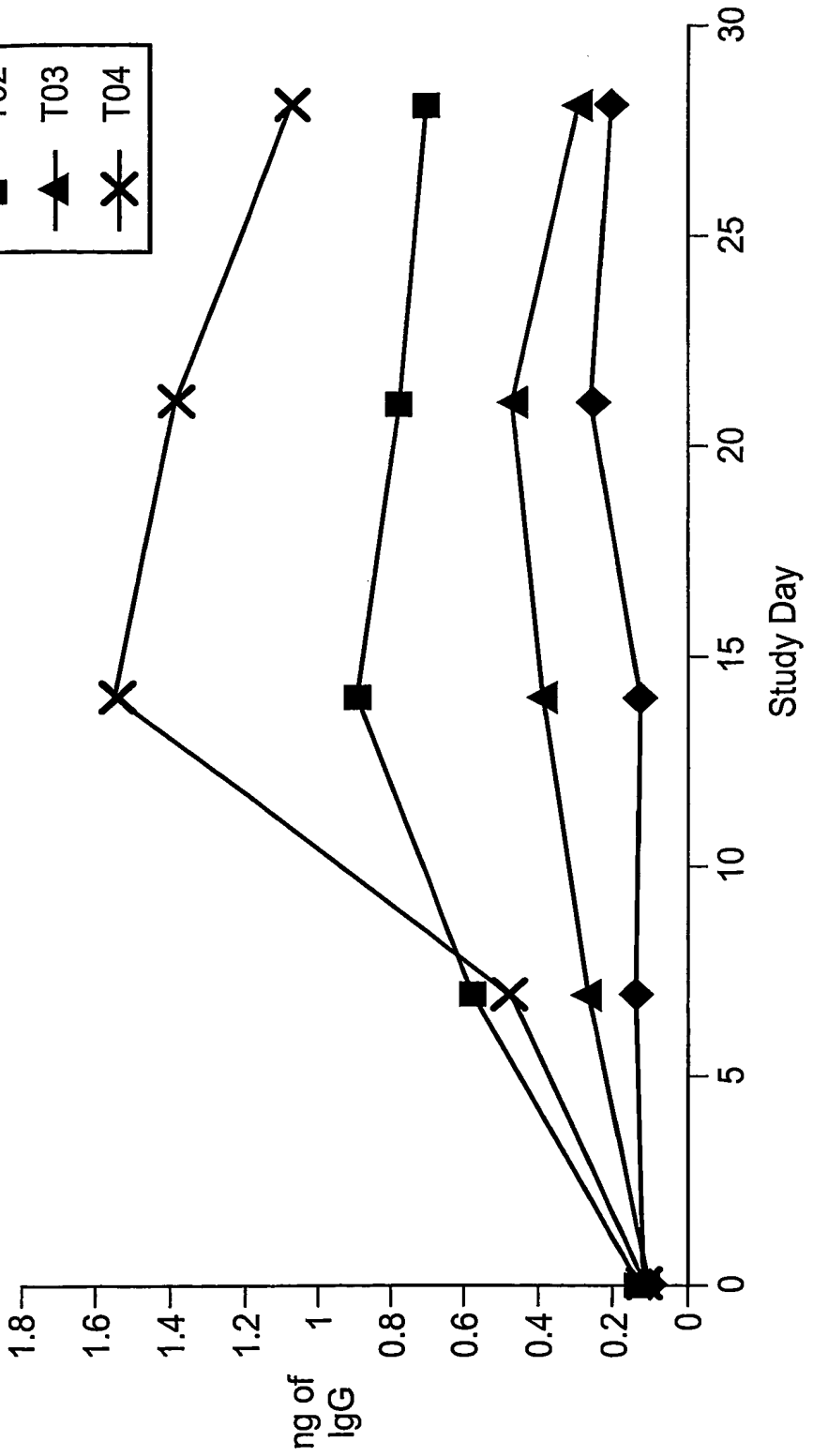

T01
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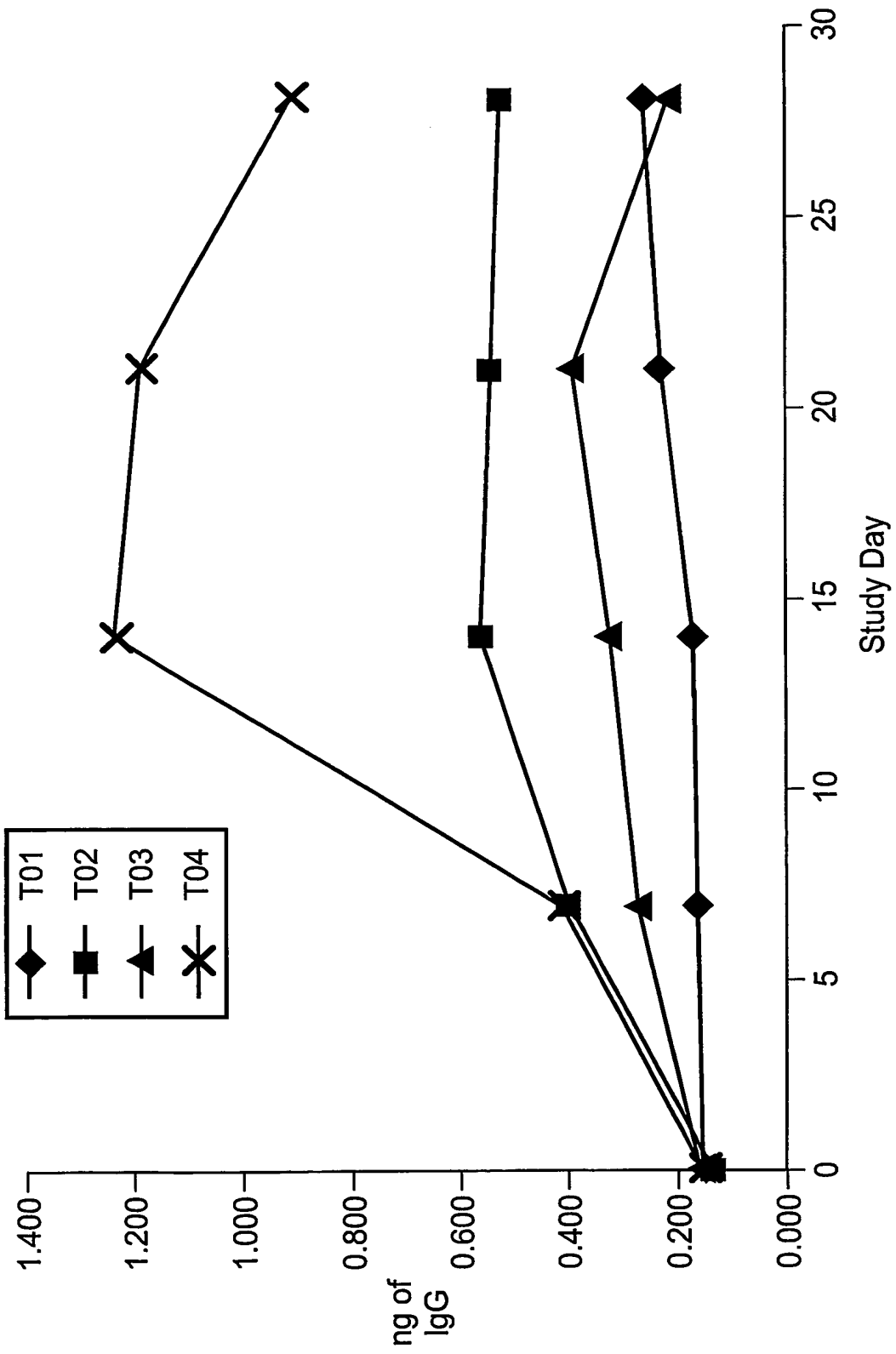
FIG. 2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